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Octant of θ_{23} and NSI degeneracy at DUNE

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We expound in detail the degeneracy between the octant of θ_{23} and flavor-changing neutral-current non-standard interactions (NSI's) in neutrino propagation, considering DUNE as a case study. In the presence of such NSI parameters involving the $e - \mu$ ($\epsilon e\mu$) and $e - \tau$ ($\epsilon e\tau$) flavors, the $\nu_\mu \rightarrow \nu_e$ and $\nu_\mu \rightarrow \nu_e$ bar appearance probabilities in long-baseline experiments acquire an additional interference term, which depends on one new dynamical CP-phase $\phi_{\{e\mu/e\tau\}}$. This term sums up with the well-known interference term related to the standard CP-phase δ creating a source of confusion in the determination of the octant of θ_{23} . We show that for values of the NSI coupling (taken one at-a-time) as small as few % (relative to the Fermi coupling constant G_F), and for unfavorable combinations of the two CP-phases δ and $\phi_{\{e\mu/e\tau\}}$, the discovery potential of the octant of θ_{23} gets completely lost.

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